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| 09/909,992 | 07/23/2001 | Susan Davis Allen | FSU-0004 | 1377 |
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| FLESHNER & KIM, LLP P.O. BOX 221200 CHANTILLY, VA 20153 | | | EXAMINER WINTER, GENTLE E | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/909,992

Applicant(s)

ALLEN, SUSAN DAVIS

Examiner

Gentle E. Winter

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 October 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 14-21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

Election/Restrictions

1. This application contains claims drawn to an invention nonelected with traverse in Paper No. 9. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. Applicant has elected to ignore the proposal made by this Examiner, which is wholly within the discretion of the Applicant, however the objection remains. The suggestion that because “thermophoresis is used to prevent redeposition of particle(s), the Examiner’s proposed title is not properly descriptive”. Examiner withdraws the proposed title and requests that Applicant provide a title consistent with accepted patent practice. Please see MPEP 606.01.

Information Disclosure Statement

3. This Examiner intended to forward a copy of the 1449 with last action. Any oversight in this regard is regretted. A copy of the initialed 1449 has been provided. The references provided with the 2/4/02 and 7/25/02 submissions were considered 5/27/03.

Response to Arguments/Remarks

4. Applicant remarked that independent claims 1 and 10 have been amended to recite “creating a temperature gradient adjacent to the surface *sufficient* to prevent the one or more

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particle(s) from redepositing on the surface.” Emphasis original. Applicant further asserts that this feature is not disclosed in the Tam reference.

Applicant argued that the rejection of claims 4-5 and 12-13 under 35 U.S.C. §103(a), which relies on the Tam reference was deficient for the reasons indicated with respect to claims 1 and 10.

5. Applicant’s arguments have been carefully considered and are not persuasive.

6. First, statements such as “the intent of the present invention is to combine with the particle process an externally applied temperature gradient sufficient to prevent particle redeposition. Such a temperature gradient could extend for distances on the order of mm to tens of cm.” The limitation may be intended, but it is not claimed.

7. Second, by failing to disclose what the “particle” is it is impossible ascertain what constitutes “sufficient”. What is sufficient for a first particle may not be sufficient for a second particle, and yet there is nothing suggesting that the temperature is sufficient to prevent the redeposition of every particle.

8. Finally, there is potentially an enablement issue with respect to exactly what mechanism is relied on to cause a temperature gradient to prevent particle redeposition. It is noted that the application recites “the medium 23 is irradiated using laser energy 25 at a wavelength which is strongly absorbed by the medium 23 causing explosive evaporation of the medium 23 with sufficient force to remove the particle 22 from the surface of the substrate.” This is exactly what

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the prior art of record does. The Tam reference discloses heating the surface and explosively evaporating liquid to aid in the removal of particulate. This action, as demonstrated by the Tam reference, cleans the substrate. If the substrate is cleaned, particles have been permanently removed. Furthermore, based on Applicant's arguments, it is not believed that applicant is suggesting that the Tam Reference fails to disclose a thermal gradient, in fact the contrary is explicitly acknowledged: "the temperature gradients generated using the methodology taught by the Tam reference are huge"; or that the thermal gradient is responsible for the ejection of the particles. It appears that Applicant is suggesting that there is a secondary, externally applied temperature gradient sufficient to prevent particle redeposition. This however is not what is claimed.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claim 1-3, 6-9, 10, and 11 is rejected under 35 U.S.C. 102(b) as being anticipated by the reference: J. Appl. Phys., Vol 71, No. 7, 1 April 1992, to Tam et al. Hereinafter (RR, corresponding to its IDS^{*}reference identifier).

2. As to claim 1, disclosing a method of removing one or more particles adhered to a surface of a sample, (figure 3a showing particles on a surface and see associated text disclosing

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that the articles are to be removed). Claim 1 further discloses the step of arranging an energy transfer medium under and around the one or more particles. The same is illustrated in figure 3 and relevant associated text. Claim 1 further discloses irradiating the one or more particle(s), the surface and/or the energy transfer medium with laser energy. Figure 3 and relevant associated text, especially at page 3518 section 1 line 8 discloses a “pulsed laser”. The claim goes on to indicate that the one or more particle(s), the surface, the substrate, and/or the energy transfer medium absorb sufficient energy in to dislodge the one or more particles. The RR reference discloses “strongly absorbed by the substrate surface” resulting in “explosive evaporation” thus removing the particle. The claim goes on to disclose the step of creating a temperature gradient adjacent to the surface to prevent the one or more particles from redepositing on the surface. Inherently the duration of the laser pulse will result in a thermal gradient, and the thermal gradient will inherently behave the same way because the claimed and disclosed method steps are identical.

3. As to claim 2, disclosing that the irradiating step comprises irradiating the energy transfer medium with laser energy, and said absorbing step comprises absorbing sufficient energy in the energy transfer medium to cause explosive evaporation thereof with sufficient force to dislodge the one or more particles. The same is disclosed in figure 3 (c) and relevant associated text. See also section 2 at page 3520.

4. As to claim 3, disclosing that the step of creating a temperature gradient adjacent to the surface to prevent the one or more particles from redepositing on the surface comprises heating

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the sample. As shown in figure 3(a) the strong substrate absorption would inherently heat the particle. Also disclosed at

5. As to claim 6, further limiting claim 2 and disclosing that the laser energy is sufficient to be absorbed by the energy transfer medium, either directly or by conduction from the substrate. See figure 3(a), (b), and relevant associated text. With respect to figure 3a the medium is heated by the substrate. In figure 3b, both the substrate and the medium are heated.

6. As to claims 7-9 further limiting claim 2 and disclosing that the energy transfer medium is at least one of a uniform layer of thickness, absorbed into interstices under and around the one or more particle(s) to be removed, and a combination thereof.

7. With specific respect to claim 8 further limiting claim 7, and disclosing that the energy transfer medium is a uniform layer of thickness, the same is disclosed in figure 3(a)-(c) and at page 3519 in the first paragraph of the second column. Discussing various techniques to ensure a uniform thickness.

8. With specific respect to claim 9 further limiting claim 7 and disclosing that the energy transfer medium is absorbed into interstices under and around the one or more particle(s) to be removed. This is disclosed the same is disclosed in figure 3(a)-(c) and at page 3519 in the first paragraph of the second column. Discussing various techniques to reduce surface tension which would inherently result in interstice filling.

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9. As to claim 10, disclosing a method of removing one or more particles adhered to a surface of a sample, (figure 2a showing particles on a surface and see associated text disclosing that the articles are to be removed). Claim 10 further discloses irradiating the one or more particles/sample combination with laser energy. See figure 2(a) and (b) and relevant associated text, especially at page 3517 section 2. The drawing and relevant associated text discloses strong particle absorption. Claim 10 further discloses absorbing sufficient energy in the one or more particle(s)/sample combination to dislodge the one or more particle(s); The same is disclosed in see e.g. column 2, section 2. Finally, claim 10 discloses creating a temperature gradient adjacent to the surface to prevent the one or more particle(s) from redepositing on the surface. The temperature gradient inherently will exist as method the steps are identical.

10. As to claim 11, disclosing that the step of creating a temperature gradient adjacent to the surface to prevent the one or more particle(s) from redepositing on the surface comprises heating the sample. Figure 2(a) and relevant associated text discloses heating the sample.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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11. Claims 4, 5, 12, and 13 rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of RR and United States Patent No. 4,987,286 to Allen (Allen).

12. As to claims 4 and 5, each and every limitation of claim 4 and claim 5 is identically disclosed in the rejection of claim 1, as set forth above, except that RR apparently does not explicitly disclose the step of creating a temperature gradient adjacent to the surface to prevent the one or more particles from redepositing on the surface. Wherein the step comprises cooling a plate disposed adjacent to the surface of the sample. Allen discloses the step of creating a temperature gradient adjacent to the surface.

13. One of ordinary skill in the thermophoresis art would have been motivated to make the instant combination for the reasons explicitly set forth in Allen, namely enhanced adsorption into the capillary spaces, thus allowing for improved cleaning see e.g. column 6, line 52 *et seq.* Specifically, Allen discloses “[i]n many cases it is preferable to dose the surface with liquid while maintaining the system at a reduced temperature *** in order to enhance adsorption into the capillary spaces.”

14. Inherently either the substrate cools the substrate support, or alternatively the support is cooled directly. See e.g. column 6, line 52. See also figures 4 and 5, especially element 72, and relevant associated text disclosing a functional equivalent, namely a vacuum source,

15. As to claims 12 and 13, each and every limitation of claim 12 and claim 13 is identically disclosed in the rejection of claim 10, as set forth above, except that RR apparently does not

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explicitly disclose the step of creating a temperature gradient adjacent to the surface to prevent the one or more particles from redepositing on the surface. Wherein the step comprises cooling a plate disposed adjacent to the surface of the sample. Allen discloses the step of creating a temperature gradient adjacent to the surface. One of ordinary skill in the thermophoresis art would have been motivated to make the instant combination for the reasons explicitly set forth in Allen, namely enhanced adsorption into the capillary spaces, thus allowing for improved cleaning see e.g. column 6, line 52 *et seq.* Specifically, Allen discloses “[i]n many cases it is preferable to dose the surface with liquid while maintaining the system at a reduced temperature in order to enhance adsorption into the capillary spaces.”

16. Inherently either the substrate cools the substrate support, or alternatively the support is cooled directly. See e.g. column 6, line 52. See also figures 4 and 5, especially element 72, and relevant associated text disclosing a functional equivalent, namely a vacuum source,

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

10. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gentle E. Winter whose telephone number is (703) 305-3403.

The examiner can normally be reached on Monday-Friday 7:00-3:30.

12. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy P. Gulakowski can be reached on (703) 308-4333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications. The direct fax number for this examiner is (703) 746-7746.

13. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Gentle E. Winter
Examiner
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December 15, 2003